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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/558,887	12/02/2005	Junichi Kuratomi	G12-195095C/KK	6130

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EXAMINER	
ARCIERO, ADAM A	
ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/558,887	KURATOMI ET AL.	
	Examiner	Art Unit	
	ADAM A. ARCIERO	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2,6-8,16,17 and 22-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,6-8,16,17 and 22-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/30/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

NONAQUEOUS ELECTROLYTE CELL

Examiner: Adam Arciero S.N. 10/558,887 Art Unit: 1795 January 5, 2009

DETAILED ACTION

1. The Applicant's amendment filed on October 16, 2008 was received. Claims 1, 3-5, 9-11, 13-15 and 18-21 were cancelled. Claims 2, 7 and 16-17 are currently amended. Claims 22-31 are newly added.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The claim rejections under 35 U.S.C. 112, first paragraph, on claims 2 and 6-8 are withdrawn, because the claims have been amended.

Claim Rejections - 35 USC § 103

4. The claim rejections under 35 U.S.C. 103(a) as unpatentable over IWAKOSHI et al. and YAMAGUCHI et al. on claims 1, 3-5, 9-11, 13-15-18 and 20-21 are withdrawn, because claims 16-17 has been amended and claims 1, 3-5, 9-11, 13-15, 18 and 20-21 have been cancelled.

5. The claim rejections under 35 U.S.C. 103(a) as unpatentable over KAZUHARA et al. and YAMAGUCHI et al. on claims 2 and 6-7 are withdrawn, because claims 2 and 7 have been amended.

6. The claim rejections under 35 U.S.C. 103(a) as unpatentable over KAZUHARA et al., YAMAGUCHI et al. and SHIOZAKI et al. on claim 8 is withdrawn, because claims 2 and 8 have been amended.

7. Claims 2 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over KAZUHARA et al. (JP 2003-068298) in view of YAMAGUCHI et al. (Pub. No. US 2002/0037458 A1).

As to Claims 2 and 6, KAZUHARA et al. discloses a lithium secondary battery (nonaqueous electrolyte battery) comprising a positive electrode, negative electrode and a nonaqueous electrolyte (paragraph [0003]). KAZUHARA et al. discloses a positive active material for the cathode comprising a composite oxide of $Li(Ni_{0.34}Co_{0.33}Mn_{0.33})_{0.99}Ti_{0.01}O_2$ (paragraph [0033]) which has a R3m rhombohedron stratified rock salt type structure (alpha-$NaFeO_2$-type crystal structure) (paragraph [0032]). KAZUHARA et al. further teaches a more general formula representing a lithium containing composite oxide for a positive active material as being $Li_aNi_xCo_yMn_zM_pO_2$ wherein 'M' can be a metal selected from either group 4a or group 5b from the periodic table of elements (Abstract). These groups include elements such as Ti (as mentioned above) and V (as claimed). This structure has compositions which fall in or are very close to the claimed ranges. According to MPEP 2144.05 [R-5], differences in concentration or

temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)." KAZUHARA et al. does not expressly disclose wherein the nonaqueous electrolyte comprises a cyclic carbonate having a carbon-carbon pi bond in an amount which is not greater than 20% by weight of said nonaqueous electrolyte.

However, YAMAGUCHI et al. teaches a nonaqueous electrolyte secondary lithium battery wherein the nonaqueous electrolyte comprises a composition including vinylene carbonate (cyclic carbonate having carbon-carbon pi bond) preferably in the amount of 0.05 wt% to 20 wt% (pg. 5, [0066]). At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the nonaqueous electrolyte battery of KAZUHARA et al. so that the nonaqueous electrolyte comprises a composition including vinylene carbonate preferably in the amount of 0.05 wt% to 20 wt% so as to enable operation of the battery at low temperature without deterioration of performance, as taught by YAMAGUCHI et al. (pg. 5, [0062]).

As to Claim 7, KAZUHARA et al. discloses that the negative electrode comprises graphite (paragraphs [0028] and [0029]).

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over KAZUHARA et al. (JP 2003-068298) in view of YAMAGUCHI et al. (Pub. No. US 2002/0037458 A1) as applied to claims 2 and 6-7 above, and further in view of SHIOZAKI et al. (JP 2003-007298).

As to Claim 8, the disclosure of KAZUHARA et al. in view of YAMAGUCHI et al. does not expressly disclose the nonaqueous electrolyte comprising a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group.

However, SHIOZAKI et al. teaches that the non-aqueous electrolyte uses a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group (paragraph [0032]). At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the electrolyte composition of KAZUHARA et al. and YAMAGUCHI et al. with a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group so that a secondary battery having high energy density and high charging/discharging cycle performance can be obtained, as suggested by SHIOZAKI et al. (Abstract).

9. Claims 16, 22, 24, 26-27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over IWAKOSHI et al. (JP 08-213015) in view of YAMAGUCHI et al. (Pub. No. US 2002/0037458 A1) and in view of DAHN et al. (US 5,498,493).

As to Claims 16, 22, 24, 26-27 and 30, IWAKOSHI et al. discloses a positive electrode active material having an α-$NaFeO_2$-type crystal structure represented by the formula $Li_xM_cNi_aCo_bO_2$ (where $0.01 \leq a \leq 0.99$, $0.01 \leq b \leq 0.99$, $0.01 \leq c \leq 0.3$, $0.8 \leq (a+b+c) \leq 1.2$). M is at least one element selected from the group comprising Al, V, Mn, Fe, Cu and Zn (Abstract and Claim 1). The value of subscript "x" is $0.8 \leq x \leq 1.2$ (paragraph [0011]). The subscripts for the chemical composition of the prior art fall within or overlap the subscript ranges as claimed by the Applicant in claim 1. Vinylene carbonate is used as the cyclic carbonate having a carbon-carbon π bond (paragraph [0020]). The negative electrode is comprised of graphite (paragraph

[0019]). The non-aqueous electrolyte uses a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group (paragraph [0021]). The non-aqueous electrolyte is comprised of $LiPF_6$ or $LiBF_4$ as an inorganic lithium salt (paragraph [0021]). The non-aqueous electrolyte is comprised of $LiN(CF_3SO_2)_2$ as an organic lithium salt having a perfluoroalkyl group (paragraph [0021]). The non-aqueous electrolyte can comprise a mixture of both vinylene carbonate, as described above, and a cyclic organic compound having no carbon-carbon π bond such as ethylene carbonate, propylene carbonate and butylene carbonate (paragraph [0020]). The negative electrode of a lithium secondary battery comprises a combination of a graphite with a lithium compound such as a lithium metal or lithium alloy (paragraph [0019]).

IWAKOSHI et al. does not expressly disclose the cyclic carbonate having a carbon-carbon π bond of claims 1 and 2 being in an amount which is not greater than 20% by weight of said nonaqueous electrolyte or that the cyclic carbonate having a carbon-carbon pi bond is vinylene carbonate used with a cyclic carbonate having no pi bond in the amount claimed.

YAMAGUCHI et al. teaches a nonaqueous electrolyte secondary lithium battery wherein the nonaqueous electrolyte comprises a composition including vinylene carbonate preferably in the amount of 0.05 wt% to 20 wt% (pg. 5, [0066]) to enable operation of the battery at low temperature without deterioration of performance (pg. 5, [0062]). The cathode active material can be a lithium transition metal oxide (pg. 2, [0019]) and the anode active material can be graphite (pg. 3, [0043]). An antioxidant is also added to the electrolyte to prevent the decomposition of the vinylene carbonate or other nonaqueous solvents by the oxygen radicals (pg. 4, [0055]). YAMAGUCHI specifically teaches using the composition of the electrolyte solution comprising EC, PC, DMC and VC in the weight ratio 10:27:5:55:3 and further, the

BHT was added to the electrolyte solution at the rate of 30 ppm (pg. 10, [0171]). At the time of the invention, a person having ordinary skill in the art would have found it obvious to use an electrolyte solution comprising EC (ethylene carbonate), PC (propylene carbonate), DMC (dimethyl carbonate) and VC (vinylene carbonate) in the weight ratio 10:27:5:55:3 and further adding BHT to the electrolyte solution at the rate of 30 ppm (pg. 10, [0171]).in a lithium battery so as to enhance the cycle characteristics of the battery without deteriorating the capacity of said battery at low environmental temperature without degradation of the electrolyte solvent, as suggested by YAMAGUCHI et al. (paragraphs [0055], [0062], [0066]).

The combination of IWAKOSHI et al. and YAMAGUCHI et al. does not expressly disclose wherein the negative electrode comprises a graphite modified by at least one of boron, phosphorus, a metal oxide and amorphous carbon.

However, DAHN et al. teaches of a lithium battery comprising a composite anode of graphite with about 1% boron added thereto (col. 2, lines 56-66). At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the graphite negative electrode of IWAKOSHI et al. and YAMAGUCHI et al. with about 1% boron, because DAHN et al. teaches that an increase in capacity is obtained (col. 2, lines 56-66).

10. Claims 17, 23, 25, 28-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over IWAKOSHI et al. (JP 08-213015) in view of YAMAGUCHI et al. (Pub. No. US 2002/0037458 A1) and in view of DAHN et al. (US 5,498,493).

As to Claims 17, 23, 25, 28-29 and 31, IWAKOSHI et al. discloses a positive electrode active material having an α-$NaFeO_2$-type crystal structure represented by the formula $Li_xM_cNi_aCo_bO_2$ (where $0.01 \leq a \leq 0.99$, $0.01 \leq b \leq 0.99$, $0.01 \leq c \leq 0.3$, $0.8 \leq (a+b+c) \leq 1.2$). M

is at least one element selected from the group comprising Al, V, Mn, Fe, Cu and Zn (Abstract and Claim 1). The value of subscript "x" is $0.8 \leq x \leq 1.2$ (paragraph [0011]). The subscripts for the chemical composition of the prior art fall within or overlap the subscript ranges as claimed by the Applicant in claim 1. Vinylene carbonate is used as the cyclic carbonate having a carbon-carbon π bond (paragraph [0020]). The negative electrode is comprised of graphite (paragraph [0019]). The non-aqueous electrolyte uses a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group (paragraph [0021]). The non-aqueous electrolyte is comprised of $LiPF_6$ or $LiBF_4$ as an inorganic lithium salt (paragraph [0021]). The non-aqueous electrolyte is comprised of $LiN(CF_3SO_2)_2$ as an organic lithium salt having a perfluoroalkyl group (paragraph [0021]). The non-aqueous electrolyte can comprise a mixture of both vinylene carbonate, as described above, and a cyclic organic compound having no carbon-carbon π bond such as ethylene carbonate, propylene carbonate and butylene carbonate (paragraph [0020]). The negative electrode of a lithium secondary battery comprises a combination of a graphite with a lithium compound such as a lithium metal or lithium alloy (paragraph [0019]).

IWAKOSHI et al. does not expressly disclose the cyclic carbonate having a carbon-carbon π bond of claims 1 and 2 being in an amount which is not greater than 20% by weight of said nonaqueous electrolyte or that the cyclic carbonate having a carbon-carbon pi bond is vinylene carbonate used with a cyclic carbonate having no pi bond in the amount claimed.

YAMAGUCHI et al. teaches a nonaqueous electrolyte secondary lithium battery wherein the nonaqueous electrolyte comprises a composition including vinylene carbonate preferably in the amount of 0.05 wt% to 20 wt% (pg. 5, [0066]) to enable operation of the battery at low temperature without deterioration of performance (pg. 5, [0062]). The cathode active material

can be a lithium transition metal oxide (pg. 2, [0019]) and the anode active material can be graphite (pg. 3, [0043]). An antioxidant is also added to the electrolyte to prevent the decomposition of the vinylene carbonate or other nonaqueous solvents by the oxygen radicals (pg. 4, [0055]). YAMAGUCHI specifically teaches using the composition of the electrolyte solution comprising EC, PC, DMC and VC in the weight ratio 10:27:5:55:3 and further, the BHT was added to the electrolyte solution at the rate of 30 ppm (pg. 10, [0171]).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to use an electrolyte solution comprising EC (ethylene carbonate), PC (propylene carbonate), DMC (dimethyl carbonate) and VC (vinylene carbonate) in the weight ratio 10:27:5:55:3 and further adding BHT to the electrolyte solution at the rate of 30 ppm (pg. 10, [0171]).in a lithium battery so as to enhance the cycle characteristics of the battery without deteriorating the capacity of said battery at low environmental temperature without degradation of the electrolyte solvent, as suggested by YAMAGUCHI et al. (paragraphs [0055], [0062], [0066]).

The combination of IWAKOSHI et al. and YAMAGUCHI et al. does not expressly disclose wherein the negative electrode comprising a graphite and at least one of a lithium metal or lithium metal-containing alloy.

However, BASU teaches of a rechargeable battery having a negative electrode comprising graphite in conjunction with lithium (col. 2, lines 15-20).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the graphite electrode of IWAKOSHI et al. and YAMAGUCHI et al. with

lithium, because BASU teaches that this combination yields maximum capacity and stability consistent with extensive rechargeability (col. 2, lines 31-34).

Response to Arguments

11. Applicant's arguments filed on September 30, 2008 with respect to claims 2, 6-8 and 16-17 have been considered but are moot in view of the new ground(s) of rejection as necessitated by Applicant's amendments.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 8am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795